

## PATENT SPECIFICATION

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B2L 26G(72) Inventors: GEOFFREY MUSCROFT  
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## (54) TREATING METALLIC BODIES

(71) We, CARRIER D R Y S Y S LIMITED, a Company Incorporated under the laws of Great Britain, of Carrier House, Warwick Row, London SW1E 5EL, England, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

5 This invention relates to the treatment of metallic bodies with liquids and in particular of hollow bodies such as automobile bodies which incorporate within their structure enclosed passageways created by joining together pressed sections to form box members or other hollow formations which provide strength and the interiors of which are to be subjected to the treatment.

10 It has been proposed to treat metallic bodies by immersing them in treating liquids contained in baths and while they are so immersed to effect turning of the bodies about an axis of rotation. This system has considerably improved the treatment of the interiors of the bodies but air locking of the cavities offers problems which reduce the rate at which the bodies can be treated.

15 It is one object of the invention to provide a method which reduces the problem of air locking and which provides for a greater degree of treatment of the interiors of bodies than has been found possible with the above-mentioned prior proposal.

20 According to the invention a method of treating with a liquid a hollow metallic body including box members or other hollow formations comprises rigidly securing the body to extend lengthwise of and to depend from an elongate body carrier, supporting the body carrier relative to a tank containing treating liquid and with at least the greater part of the body immersed in the treating liquid, moving the body and body carrier lengthwise of the tank and during said lengthwise movement causing the treating

liquid to swash into and out of the box members or other hollow formations of the body by moving the opposite ends of the body carrier up and down alternately. Swashing by up and down movements contributes significantly to the successful treatment of the article by replacing the liquid in such areas as box sections (where the concentration of essential reactants becomes depleted) by fresh liquid with the correct concentration of constituents.

25 The invention also contemplates apparatus for carrying the method into effect.

The invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings, in which:—

30 Figures 1 and 2 diagrammatically illustrate one form of apparatus for carrying the invention into effect.

35 Figures 3 diagrammatically illustrates a modification of Figure 1, and

40 Figures 4 and 5 diagrammatically illustrate another modified form of the apparatus of Figure 1.

45 Referring to the drawings, in each of the embodiments about to be described the hollow metallic bodies to be treated are considered to be automobile bodies 1 and each is supported by a cradle 2 which in Figure 1 is a cradle of the kind described in British Patent Specification No. 1395383. The cradle 2 is secured to an elongate body carrier 3, the longitudinal axis of which is transverse to the length of a bath or tank 4 containing a treating liquid 5 the level of which is indicated at 5a. The opposite ends of the body carrier 3 are located in dogs 6 carried by endless chains which run around sprockets, not shown, and extent lengthwise of the tank 3 so that the body 1 is transported with the length thereof transverse to the length of the tank. The upper runs 7, 8 of the chains move lengthwise in oppositely disposed undulating paths as shown in Figure 2 while the lower, or return, runs

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9 of the chains move in a straight path. Thus as the body 1 is moved along the length of the tank at least the greater part of the body is immersed in the liquid 5 and the opposite ends of the body carrier 3 are moved alternately in opposite directions, that is up and down as illustrated in Figure 1 in a manner such as to cause the liquid 5 to be displaced inside the body and to swash into and out of the box-like sections and cavities of the body. Adjacent the opposite ends of the body carrier which are located in the dogs 6 the body carrier is provided with spherical wheel seatings 10 arranged to react to side loading. The chains may be driven in any desired manner, not shown, and the carrier with a body attached thereto by its cradle is located in the dogs 6 and is removed therefrom by a hoist, not shown, of any suitable construction carried by an overhead conveyor, not shown.

Due to the movement of the body carrier, and the body secured thereto, in alternate opposite directions the treating liquid is subjected to agitation which causes the said swashing of the liquid relative to the body and the movements of the body ensure not only that air entrapped in cavities escapes freely but that the liquid swashes over the whole of the interior surfaces of the body and its cavities. This provides the benefit of better overcoming inhibitions to chemical processes, of avoiding frequent changing of solutions, of venting of nascent hydrogen, when present, and permits the oxidising agents, accelerators, or toners, when used, to reach the innermost parts of the cavities effectively. It is found that, in general, the multidirectional displacement of the body to liquids improves all chemical actions, rinsing, and washing processes.

In Figure 1 the body 1 is shown as being supported top uppermost by the cradle 2 but, if desired, the body may be attached to the body carrier 3 in an inverted position, e.g. by skids 11 as indicated in Figure 3.

Figure 3 illustrates a modification to Figure 1 in which the opposite ends of the body carrier 3 are pivoted at 12 to frames 13 carried by the chains. In this embodiment the body moved up and down as described above. The frames 13 are stabilised by castor rollers 14.

In the embodiment of Figures 4 and 5 the body carrier 3 is mounted on a frame 15 which is located outside the tank 4 and is supported on rollers 16, Figure 4, for reciprocatory movement lengthwise of the tank. The frame 15 is a rectangular frame the longitudinal sides of which are provided with undulating tracks 17 along which the body carrier is moved. Reciprocation of the frame 15 is effected by operating mechanism 18 at one or both ends thereof. With this embodiment not only is the body moved up

and down in the liquid but also as it is moved lengthwise of the tank it is moved alternately back and forth.

#### WHAT WE CLAIM IS:—

1. A method of treating with a liquid a hollow metallic body including box members or other hollow formations, comprising rigidly securing the body to extend lengthwise of and to depend from an elongate body carrier, supporting the body carrier relative to a tank containing treating liquid and with at least the greater part of the body immersed in the treating liquid, moving the body and body carrier lengthwise of the tank and during said lengthwise movement causing the treating liquid to swash into and out of the box members or other hollow formations of the body by moving the opposite ends of the body carrier up and down alternately. 70

2. The method according to Claim 1 in which the body carrier is supported relative to the tank with the longitudinal axis of the body carrier transverse to the length of the tank. 85

3. Apparatus for the liquid treatment of a hollow metallic body including box members or other hollow formations, comprising a tank arranged to contain a treating liquid, an elongate body carrier to which a body is arranged to be rigidly secured to extend lengthwise thereof and to depend therefrom, body carrier supporting means operable to move the body carrier lengthwise of the tank with at least the greater part of a body depending therefrom immersed in the treating liquid, and rocking means operable while a body secured to the body carrier is so immersed in the treating liquid to move the opposite ends of the body carrier up and down alternately. 90

4. Apparatus according to Claim 3, wherein the body carrier supporting means comprises endless chains to which the body carrier is connected with the longitudinal axis thereof transverse to the length of the tank, and wherein the rocking means co-operate with the upper runs of the chains to form oppositely disposed undulating paths therefor to effect said up and down movements of the opposite ends of the body carrier. 100

5. Apparatus according to Claim 3, wherein the body carrier supporting means comprises endless chains carrying frames to which the opposite ends of the body carrier are pivoted, and wherein the rocking means is operable to rock the carrier about the longitudinal axis thereof. 110

6. Apparatus according to Claim 4, wherein the chains carry frames to which the opposite ends of the body carrier are pivoted and the body carrier is additionally rockable about the longitudinal axis thereof. 125

7. Apparatus for the liquid treatment of a hollow metallic body including box mem- 130

bers or other hollow formations, constructed  
and arranged to operate substantially as  
herein described with reference to Figures  
1 and 2, to Figure 3, or to Figures 4 and 5  
of the accompanying drawings.

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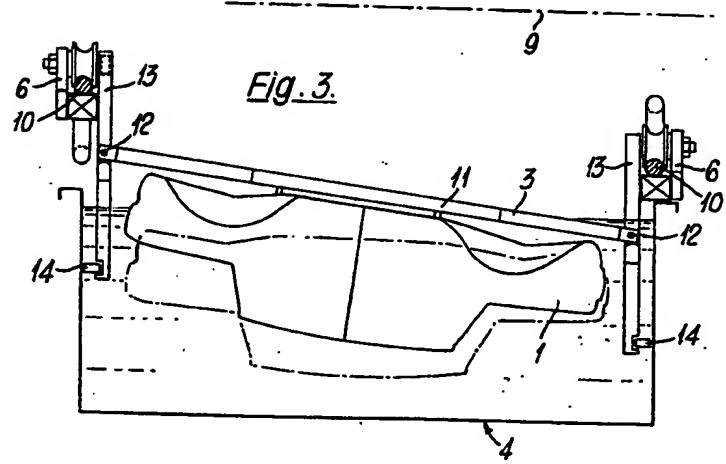
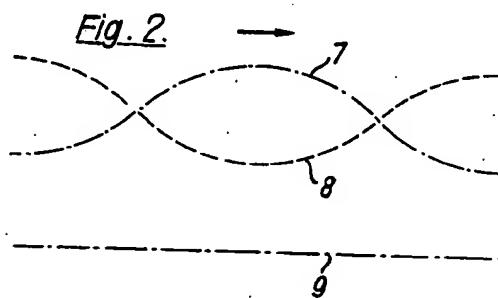
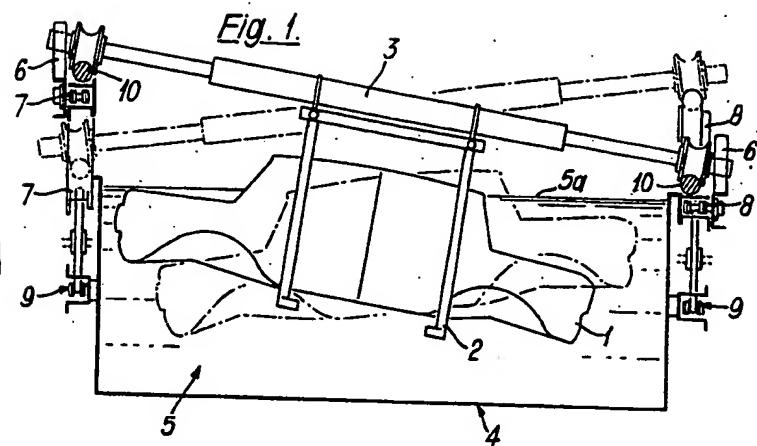
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COMPLETE SPECIFICATION

3 SHEETS

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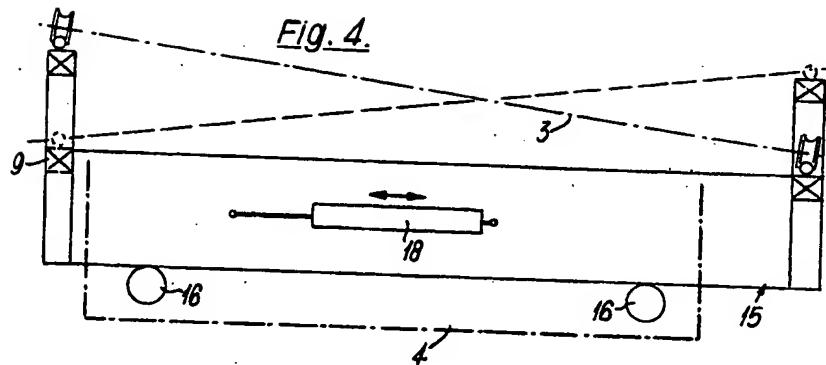
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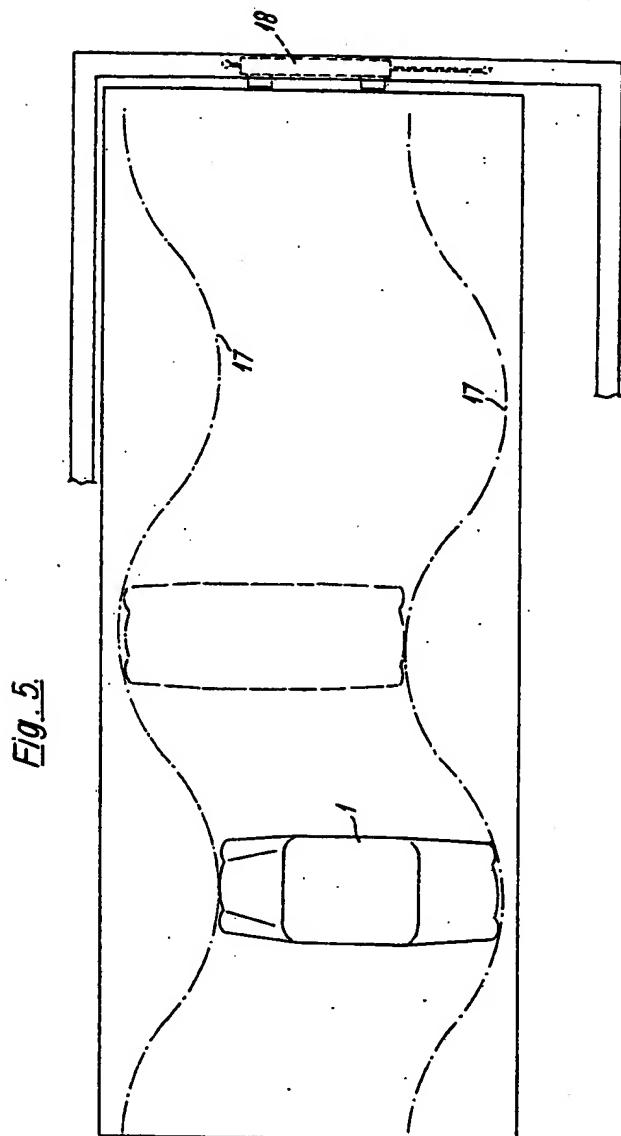


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Sheet 3



*Fig. 5*